Occurrence of Autogenous *Culex pipiens* Linnaeus, 1758, (Diptera: Culicidae) in Argentina and Notes on Distribution of the Complex

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ABSTRACT. Collection records of *Culex pipiens* sensu strictu from the Patagonian region of Argentina are presented. These records confirm the occurrence of this species in Rio Negro Province, and establish its presence in Chubut Province. Laboratory studies showed a high rate (77%) of autogeny among progeny of field-collected females from near Trelew, Chubut Province. This biotype also bites humans under insectary conditions. A general outline of the distribution of the *Cx. pipiens* complex in Argentina is given. *Culex quinquefasciatus* occurs from Buenos Aires and Mendoza Provinces northward, and *Cx. pipiens* from Buenos Aires southward through Santa Cruz Province.

INTRODUCTION

The putative distribution of the *Culex pipiens* complex in Argentina was mapped by Mattingly (1951). He showed *Culex fatigans* Wiedemann 1829, occurring throughout the country north of the Rio de la Plata; *Culex pipiens* Linnaeus 1758, in Buenos Aires Province; and both species in the city of Buenos Aires and immediately to the north. Mattingly's distribution map south of the Rio Negro, which includes all of Patagonia, was left blank. Recent collections by two of the authors (C. J. Mitchell and T. P. Monath) in Rio Negro and Chubut Provinces (Fig. 1), a thorough review of the literature, and new information from unpublished sources help clarify knowledge about distribution of the *Cx. pipiens* complex in southern Argentina.

LITERATURE REVIEW AND RECORDS FROM UNPUBLISHED SOURCES

Published references to the occurrence of *Cx. pipiens* sensu strictu in Argentina have been based largely on Lynch Arribalzaga (1891), Brethes (1912, 1916) and Dyar (1918, 1919). Lynch Arribalzaga (1891) noted that *Cx. pipiens* (sensu latus) (as *Cx. flavipes* Macquart 1838[1]) was abundant in the city of

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[1] *Culex flavipes* Macquart 1838 is now considered to be a synonym of *Aedes albifasciatus* (Macquart 1836) per Edwards (1930, p. 110) and Knight and Stone (1977, p. 122).

Buenos Aires and in most villages in the province, where it was more closely associated with human habitations than any other mosquito. Subsequently Brethes (1912; 1916 as *Cx. flavipes*) also reported it to be common in houses in Buenos Aires and discussed the taxonomic problems with the species, i.e., *flavipes* versus *pipiens*. Brethes (1916) presented good illustrations of the male terminalia of specimens from near Santiago, Chile and Buenos Aires, Argentina. These drawings led Dyar (1918) to conclude that *Cx. pipiens* was the common domestic mosquito of the region. He subsequently examined Brethes' specimens and confirmed that they were indeed *Cx. pipiens* (Dyar 1919). Galindo (1943) examined Brethes' (1916) illustrations and concluded that *Cx. pipiens molestus* was represented by the drawings. Bachmann and Bejarano (1960) recorded *Cx. pipiens* from Neuquen, Rio Negro, and Santa Cruz Provinces. Although they do not indicate whether these records are based on male terminalia, the records are in accord with the expected distribution of the species in Argentina.

Prosen et al. (1960), in discussing the distribution of Argentine mosquitoes, state "si exceptuamos a los *Aedes albifasciatus* (Macq.) y *Culex quinquefasciatus* Say, de amplisima dispersion meridional en el pais y a los que encontramos hasta Tierra del Fuego y Santa Cruz, respectivamente." Carcavallo and Martinez (1968) make a similar statement when referring to the distribution of *Cx. pipiens quinquefaciatus* (sic), "Esta especie, al igual que *Aedes albifasciatus*, como lo decimos precedentemente, es de las de más amplia distribución en nuestro territorio, encontrandoselas por el sur hasta Santa Cruz y Tierra del Fuego, respectivamente." We interpret these statements to mean that whereas *Ae. albifasciatus* occurs in Tierra del Fuego, *Cx. pipiens* (sensu latus) occurs only as far south as Santa Cruz Province. This interpretation is supported by the records for these species given by Bachmann and Bejarano (1960).

Balseiro (1982) collected *Cx. pipiens* in La Plata, Buenos Aires Province, and Gillies (in litt.) also identified a few specimens of *Cx. pipiens* from the city of Buenos Aires. Duret (in litt.) has records of *Cx. pipiens* sensu strictu based on male terminalia from the following Provinces and locations: Buenos Aires (Federal Capital); Mendoza (Uspallata, Las Toscas); San Luis (Arrayan, Quines); and San Juan (Marquesado).

MATERIALS AND METHODS

Mosquitoes were collected by mechanical aspirator and a Centers for Disease Control (CDC) miniature light trap with the light bulb removed. Dry ice served as the attractant for the trap and mosquitoes were blown into the collecting bag by the trap's battery-operated fan. Mosquitoes used to establish the insectary colony from Trelew, Chubut Province, were collected in this manner, transferred to a pint carton covered with nylon tulle, given sugar water, and hand-carried by air to Fort Collins, Colorado. Female mosquitoes were fed on a day-old chick five days following collection. A colony was established and maintained using standard insectary procedures. The rate of autogeny was estimated by dissecting the ovaries of 6- to 10-day-old females derived from the first egg batches laid by the field-collected females. These females were maintained on 5% sucrose solution from the time of emergence and were, of course, deprived of an opportunity to feed on blood before dissection.

The procedure used to mount the male genitalia was essentially that published by Darsie and Ramos (1969, p. 116). The genitalia were heated at 50° C for 20 minutes in 10% KOH and washed twice in distilled water before being transferred to 50% and 100% cellosolve. Dissection was performed in a U. S. Bureau of Plant Industry watch glass in 100% cellosolve, after which the specimen was transferred to a microscope slide. The excess cellosolve was removed and thin Canada balsam added. After the final arranging of the genitalia, the slide was placed in a drying oven at 50° C overnight. The coverslip was added the next day by placing on it a drop of thin balsam, inverting it and gently putting it on top of the partially dried balsam containing the genitalia. If needed, additional balsam was deposited at the edge of the coverslip.

We followed the method of Barr (1957) to measure the DV/D ratios, i.e., the ratio determined by dividing the average extension of the two ventral arms lateral to the dorsal arms of the phallosome (DV) by the distance between the two dorsal arms at their intersections with the ventral arms (D).

RESULTS

A single collection of 4 male mosquitoes was aspirated from the walls of a service station washroom at San Antonio Oeste, Rio Negro Province (Fig. 1) on March 5, 1984. San Antonio Oeste is located at 40° 40 min. S. latitude and 65° 0 min. W. longitude. The range in the DV/D ratio for the 4 terminalia is -0.025 to -0.048 and the mean is -0.036. Also, the dorsal arm of the phallosome is truncated (Fig. 2). All specimens are typical *Cx. pipiens* sensu strictu.

A CDC miniature light trap was operated, as described above, during the night of March 7, 1984, at a rural agricultural experiment station, Instituto Nacional Technico y Agropecuario (INTA), located approximately 8 km. south of Trelew, Chubut Province (Fig. 1). Trelew is located at 43° 10 min. S. latitude and 65° 20 min. W. longitude. The trap was operated overnight in the uncovered stairwell of a flooded basement that opened directly to the outside. Sixty-five female and 5 male mosquitoes were collected and transported live to Colorado for establishment of an insectary colony. A random sample of 28 male progeny of the field-collected females showed an average DV/D ratio of -0.048 (S.D. 0.019; range 0 to -0.098). Again, all specimens were typical *Cx. pipiens* sensu strictu (Fig. 3).

The rate of autogeny among 100 female progeny of the field-collected specimens was 77%. A few females from the same generation fed on man when an arm was inserted into the colony cage in a lighted insectary room.

DISCUSSION

Our collection records confirm the occurrence of *Cx. pipiens* sensu strictu in Rio Negro Province as previously reported by Bachmann and Bejarano (1960), and establish its presence in Chubut Province, Argentina. Also, it is apparent that the biotype we collected in Trelew is autogenous and that it will

bite humans. Barr (1967) suggested that there is a strong selection pressure for autogeny among relatively isolated populations of *Cx. pipiens* from subterranean habitats. Although the flooded basement where our collection was made opened directly to the outside, it is possible that the population sampled was more or less restricted to this subterranean habitat.

A great deal of work remains to be done before the distribution of the *Cx pipiens* complex in Argentina can be rigorously defined. In general, the distribution of the cosmotropical *Cx. quinquefasciatus* in Argentina can be summarized as follows. Shannon (1931) established its presence in the northern part of the country, and Duret (1953) recorded it from the following provinces: Buenos Aires, Catamarca, Chaco, Corrientes, Entre Rios, Formosa, Jujuy, La Rioja, Misiones, Salta, Santa Fe, Santiago del Estero, and Tucuman. Duret (in litt.) indicates that this species occurs from Buenos Aires and Mendoza Provinces northward. It is now clear that *Cx. pipiens* sensu strictu occurs from Buenos Aires Province southward through Santa Cruz Province. Major questions remain to be answered regarding the range of overlap and possible intergradation between *Cx. pipiens* and *Cx. quinquefasciatus* in Argentina.

Information concerning the distribution and biology of *Cx. pipiens* complex mosquitoes in Argentina is of more than just academic interest. Such information is essential before the potential importance of the members of the complex as arbovirus vectors can be fully assessed. Villa et al. (1962) reported the experimental transmission of western equine encephalitis (WEE) virus from chick to chick by an Argentine strain of *Cx. pipiens*. In view of the lack of susceptibility of *Cx. pipiens* complex mosquitoes from North America to infection with WEE virus, this finding needs to be confirmed using more quantitative techniques. Mitchell et al. (1985) isolated St. Louis encephalitis (SLE) virus from *Cx. quinquefasciatus* collected in Santa Fe Province, and Mitchell et al. (1980) demonstrated that a strain of *Cx. quinquefasciatus* from Santa Fe Province was an efficient experimental vector of SLE viral strains from that area and from the United States. Therefore, there is a practical need to further study the taxonomy, distribution, and ecology of members of the *Cx. pipiens* complex in Argentina.

ACKNOWLEDGMENTS

We are especially grateful to Dr. J. P. Duret, Buenos Aires, Argentina, and Dr. M. T. Gillies, Sussex, England, for their generosity in sharing their unpublished records with us and for bringing pertinent literature to our attention. Also, we thank Dr. A. R. Barr, University of California, Los Angeles, for providing the pertinent section from P. Galindo's (1943) unpublished Master's Thesis.

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Figure 1. Map of the area where *Cx. pipiens* was collected in Rio Negro and Chubut Provinces, Argentina.

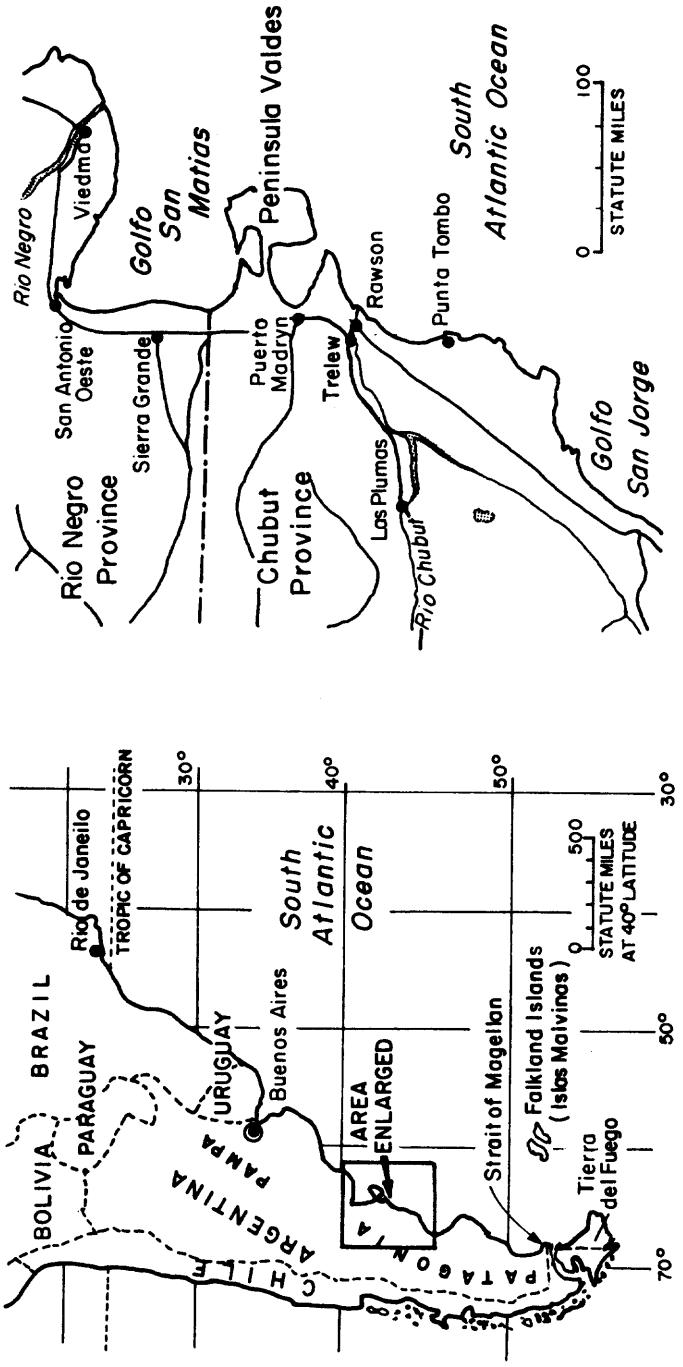

Figure 2. Male genitalia of *Cx. pipiens* from San Antonio Oeste, Rio Negro Province, Argentina.

Figure 3. Male genitalia of *Cx. pipiens;* progeny of female collected near Trelew, Chubut Province, Argentina.